REMARKS/ARGUMENTS

The specification has been amended to update the status of cited applications. Claims 1, 12, 15, and 21 have been amended to provide consistent terms and proper antecedent basis for "preformed photosensitive silver halide grains".

A **Terminal Disclaimer** and **Rule 132 Declaration** by Co-Applicant Sharon Simpson are enclosed for reasons discussed below.

Rejections Under 35 U.S.C. §103

I. Claims 1-13, 15-17, and 19-23 have been rejected as unpatentable over U.S. Patent 5,891,615 (Winslow et al.) taken with U.S. Patents 3,895,951 (Riester et el.) and 3,457,075 (Morgan et al.).

II. Claims 14 and 18 have been rejected as unpatentable over Winslow et al. taken with Riester et al., Morgan et al., and U.S. Patent 6,440,649 (Simpson et al.).

Both of these rejections are respectfully traversed for reasons presented below. Each one is considered in turn.

Rejection I:

The Office Action supports its rejection with Winslow et al. as the primary reference for its teaching relating to preparing a photothermographic emulsion comprising the step of providing silver halide grains and a non-photosensitive silver source, and chemically sensitizing the silver halide grains by decomposing an organic sulfur-containing compound (such as merocyanine dye) in an oxidizing environment. This reference is also alleged to describe photothermographic emulsions and materials as well as the conversion of part of the organic silver salt to silver halide with a halogen-containing compound.

Riester et al. et al. is said to describe the use of various phosphine sulfides as "supersitizers" to increase the spectral sensitization of the silver halide. It is alleged that Riester et al. then teaches the use of such compounds in the photothermographic materials of the presently claimed invention.

Morgan et al. is cited for its disclosure of forming *in situ* silver bromide using a source of halide ion in reaction with silver ions of the organic

silver salt that is said to enhance the image forming capacity of the composition far beyond the use of preformed silver halide alone (Col. 4, lines 7-22).

Applicants' Invention:

Applicants' claimed invention is directed to preparing a photothermographic emulsion and material using a specified order of steps and the defined diphenylphosphine sulfide compounds. The method includes:

A) providing a photothermographic dispersion of preformed photosensitive silver halide grains and a non-photosensitive source of reducible silver ions,

B) providing one or more of the defined diphenylphosphine sulfide compounds in association with the dispersion of step A),

C) chemically sensitizing the preformed photosensitive silver halide grains by decomposing the diphenylphosphine sulfide on or around the preformed photosensitive silver halide grains in an oxidative environment, and

D) converting some of the reducible silver ions to photosensitive silver halide grains.

Photothermographic materials are constantly being redesigned to meet ever-increasing performance, storage, and manufacturing demands raised by customers, regulators, and manufacturers. One of these demands is increased photospeed without a significant increase in fog (D_{min}) or a loss in D_{max}. Thus, while the current commercial method of chemical sensitization described in U.S. Patent 5,891,615 (Winslow et al.) has provided increased photospeed for photothermographic emulsions over previous methods, there is a continued need for a further improved method that provides even greater photospeed for such emulsions.

Applicants have met that need. The present invention provides photothermographic emulsions and materials having increased photospeed ("speed") by using the noted sequence of steps and diphenylphosphine sulfides for chemical sensitization when compared to the use of sulfur-containing spectral sensitizing dyes known in the art (e.g. the merocyanines of Winslow et al.).

Example 2 of the present application (pages 78-79) provides comparative data that is evidence of patentability over the teaching in the art. Several photothermographic materials were prepared, imaged, and evaluated

using the procedures described in Example 1 (pages 73-76). Control Example 2-1 contained no chemical sensitizer and Comparative Example 2-2 was prepared using a merocyanine dye as a chemical sensitizer according to Winslow et al. Inventive Examples 2-3 and 2-4 were prepared using two diphenylphosphine compounds according to the present invention.

The sensitometric results obtained from these photothermographic materials are shown in TABLE II (page 79). The photospeeds (measured at two places on the Density vs. log E curve, SP-2 and SP-3) were unexpectedly increased using the method of the present invention compared to both the Control and Comparative Example 2-2. In the case of SP-2, the increase was 12% and 22%, and for SP-3, the increase was 8% and 18%, over the Comparative Example 2-2 (Winslow et al. method). Thus, Applicants have demonstrated that the use of representative diphenylphosphines as chemical sensitizers provides unexpected photospeed increase over the use of known sulfur-containing compounds.

In addition, Applicants have provided a **Rule 132 Declaration** by Co-Applicant Sharon Simpson in which she describes the comparative Example 8 provided in co-pending and commonly assigned U.S. Serial No.10/731,251 (filed 12/9/03). While the invention described and claimed in that copending application is directed to the use of a combination of Au(III) compounds and diphenylphosphine sulfides as chemical sensitizers in photothermographic materials, the Example 8 comparative results are equally cogent as evidence for patentability of the presently claimed invention.

Dr. Simpson points out in her Declaration, as well as in Example 8 (pages 102-103) of the copending U.S. Serial No. 10/731,251 that the use of a diphenylphosphine sulfide compound provided significantly better photospeed and image contrast in photothermographic materials compared to the use of a triphenylphosphine sulfide that is outside the scope of the present invention. These results are evidence of unexpected results because Applicants do not claim the use of just any phosphine sulfide or phenylphosphine sulfide. Rather, they claim the use of only certain diphenylphosphine sulfides and the use of phosphine sulfides outside of the claimed invention are less effective as chemical sensitizers.

Rebuttal to Rejection:

Applicants respectfully submit that the rejection of Claims 1-13, 15-17, and 19-23 is in error because: (1) Riester et al. has been improperly combined with Winslow et al. and Morgan et al. and those two references cannot support a rejection alone; (2) even if all three references are properly combined, no *prima facie* case for unpatentability has been made; and (3) even if the three references are properly combined, Applicants have provided a showing of unexpected results over the combined teaching.

Riester et al. has been improperly combined with the other two references. Riester et al. is directed to photographic materials containing a silver halide, which materials are processed after exposure, using wet photographic processing solutions (e.g. Col. 17, lines 30-44). Nothing in Riester et al. hints of "dry-processed" photothermographic materials and as is well known from dozens of publications, one cannot predict the utility of photographic components in photothermographic materials because of the very different imaging chemistries, conditions, and retention or lack of retention of imaging chemistries in the imaged materials. The differences between photothermography and photography are outlined on pages 2-4 of the present application and several references cited therein. Also, as noted on page 5 (lines 13-30), the effects of chemical sensitizers used in photographic emulsions and materials are not necessarily achievable in photothermographic emulsions and materials. The best that can be said for such chemical components is that they would be "obvious to try" in photothermographic materials but without any reasonable expectation of success, merely trying the compounds in the photothermographic materials does not render such use unpatentable. Thus, without motivation in the art in general or in Riester et al. specifically, one skilled in photothermography would not consult Riester et al. to find "new" chemical sensitizers for use with Winslow et al. and Morgan et al. emulsions.

Without Riester et al., the two remaining references fail to support a *prima facie* rejection because there is nothing in either reference to hint of Applicants' diphenylphosphine sulfides for any purpose.

Even if Riester et al. could be properly combined with Winslow et al. and Morgan et al., the combined teaches fails to provide a *prima facie* basis for unpatentability of the claimed invention.

Applicants agree that Winslow et al. teaches a useful method for chemical sensitization by decomposing sulfur-containing dyes onto silver halide grains. The sulfur-containing compounds described in Winslow et al. do not include the diphenylphosphines used in the present invention. Moreover, while *in-situ* silver halide grain formation is mentioned in Winslow et al. (Col. 13, lines 38-41) there is no mention of using both preformed silver halide grains and formation of other silver halide grains *in situ* after chemical sensitization. Thus, Winslow et al. is deficient in teaching Applicants' required decomposition of diphenylphosphine sulfides onto the preformed silver halide grains followed by formation of additional, non-chemically sensitized silver halide grains by an *in situ* process after chemical sensitization.

The Office Action attempts to supply the missing teaching with Riester et al. and Morgan et al. This attempt fails for the following reasons.

Riester et al. is directed to the use of a wide variety of phosphine sulfides in photographic materials. However, Riester et al. does not teach the use of such compounds as chemical sensitizers. Rather, those compounds are used as "supersensitizers" for spectral sensitizing dyes. In other words, they are used to enhance the performance of known spectral sensitizing dyes, and more conventional compounds are then used as chemical sensitizers (see Col. 1, lines 37-48; and Col. 15, line 69 to Col. 16, line 26). The Examiner's attention is also directed to Example 1 where the merocyanine is added to the emulsion as a spectral sensitizer (Col. 17, lines 3-5). The phosphine sulfide compound was added and found to increase sensitivity of the spectral sensitizing dye (Table I). Similar teaching is found in the remaining examples. However, there is nothing to suggest chemical sensitization in the Examples using any type of compound let alone the phosphine sulfides.

Riester et al. also teaches that the phosphine sulfides can be added at any time in the preparation of a silver halide photographic emulsion (Col. 15, lines 16-24). There is no critical addition sequence for any type of emulsion let alone a photothermographic emulsion. This is in stark contrast to the present invention and Winslow et al. where sulfur-containing compounds must be added at a specific time to chemically sensitize the preformed silver halide grains. This is additional evidence that Riester et al. is not teaching the use of these compounds as chemical sensitizers. Adding the phosphine sulfides at any time as

taught by Riester et al. would produce many worthless embodiments—chemical sensitization just would not occur. For example, adding the phosphine sulfide after the addition of PHP (bromide-containing oxidizing agent) results in fogged emulsions. Moreover, if one combined the teaching of Winslow et al. and Riester et al., a skilled worker would be confused as to which procedure to follow since the Winslow et al. procedure would be one of many options.

One skilled in the art following the combined teaching of Riester et al. and Winslow et al. would recognize that Riester et al. teaches the use of numerous conventional chemical sensitizers (Col. 15, line 69 to Col. 16, line 26). However, such chemical sensitizers are not useful in the method of Winslow et al. In fact, Winslow et al. teaches away from the use of these conventional compounds (Col. 9, lines 10-24). There is nothing in Riester et al. to suggest that the phosphine sulfides should be used as "chemical" sensitizers since they are used only to enhance the sensitivity of the "spectral" sensitizers only. Morgan et al. is not helpful to overcome this deficiency because it does not appear to suggest chemical sensitization for photothermographic emulsions.

Thus, the combination of the three references fails to teach or suggest the presently claimed invention because it would teach the use of conventional chemical sensitizers from Riester et al. with the decomposition of merocyanine dyes from Winslow et al. In addition, even if phosphine sulfides are used, it fails to teach a criticality of using them at a critical point in the method because they are to be used only for "supersensitization" of spectral sensitizers, not as chemical sensitizers.

In addition, Applicants have demonstrated that the use of diphenyl phosphine sulfides according to the present invention provides unexpected results compared to the method of Winslow et al. and Riester et al. Applicants would point to the above discussion of the comparative results shown in Example 2 wherein the method of Winslow et al. was compared to the present invention. Applicants' method unexpectedly provided photothermographic materials with increased speed over the prior art method. These results are not suggested by anything in Winslow et al., Riester et al., or Morgan et al. because the results are not predictable from their teaching, individually or in combination.

Further, the enclosed **Rule 132 Declaration** provides additional evidence of unexpected results as it clearly shows from the data provided in

copending U.S. Serial No. 10/731,251 that not just any phosphine sulfide will provide an increase in photospeed. Dr. Simpson has demonstrated that Applicants' choice in phosphine sulfide structure is critical to achieving the unexpected results. These unexpected results are not predictable from any teaching in the cited references, and in particular Riester et al., because Riester et al. broadly describes the useful "intensifying" compounds as having hundreds of possible aliphatic, cycloalkyl, aralkyl, aryl, or heterocyclic "R" substituents (Cols. 1-2). Riester et al. gives no preferences for the "R" substituents but lists 87 examples of compounds "particularly suitable for intensifying the sensitization effect of silver halide emulsion layers achieved with merocyanines" as spectral sensitizing dyes (Col. 3, line 15 to Col. 10, line 33). Compound 1 in Riester et al. is triphenylphosphine sulfide that was tested in the comparative example of Example 8 cited in Dr. Simpson's Declaration. Compound 1 was used in Examples 1, 3, 4, 5, 6, 7, and 8 of Riester et al. A few other compounds were also tested, but Compound 1 is clearly the preferred phosphine sulfide in Riester et al. from its predominance in the examples. Thus, it has been demonstrated that the use of Applicants' specific diphenylphosphine sulfides is unexpectedly better in photothermographic materials over the closest compound in Riester et al.

For all of these reasons the rejection of the claims over Winslow et al., Riester et al., and Morgan et al. is in error and should be withdrawn.

Rejection II:

Dependent Claims 14 and 18 have been rejected over the combination of Winslow et al., Riester et al., Morgan et al., and Simpson et al. This rejection is in error for the same reasons stated above in rebuttal of Rejection I. Nothing in Simpson et al. overcomes the deficiencies in the other three references. Simpson et al. is merely cited for its use of phosphors in photothermographic materials. While Applicants believe that Claims 14 and 18 are separately patentable over the combined four references, Applicants are not relying upon the recited phosphor for patentability of the generic invention. Rather, those dependent claims are also patentable because they are dependent upon patentable Claims 1 and 15. Thus, this rejection should be withdrawn.

Double-Patenting Rejections

III. Claims 1-23 have been rejected as being unpatentable under the judicially created doctrine of obviousness-type double patenting over Claims 1-19 of Winslow et al. taken with Morgan et al. and Riester et al.

IV. Claims 1-23 have also been rejected as being unpatentable over Claims 1-27 of pending and commonly assigned U.S. Serial No. 10/731,680 (Burleva et al.) having a common filing date with the present application.

Both of these rejections are traversed for reasons presented below. Each one is considered in turn.

Rejection III:

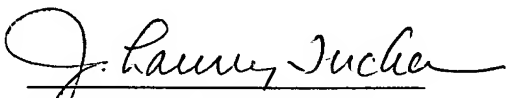
This double patenting rejection over the claims of Winslow et al. taken with Morgan et al. and Riester et al. is faulty for the same reasons stated in rebuttal of Rejection I. Reister et al. is not properly combined with the claims of Winslow et al. any more than its text for the reasons stated above. Moreover, even if combined, the teaching of the claims with Morgan et al. and Riester et al. fails to provide a case for *prima facie* obviousness, and Applicants have also provided a showing of unexpected results that is evidence of patentability. Thus, the double patenting rejection over the claims of the 6-year old Winslow et al. with the two even older patents is clearly unreasonable and without merit.

Rejection IV:

This rejection is also traversed on the merits. However, in order to expedite prosecution, a **Terminal Disclaimer** is provided herewith to overcome the double patenting rejection.

Since all of the issues raised in the Office Action have been appropriately addressed with the foregoing amendments and remarks, reconsideration of this patent application is respectfully requested. A prompt and favorable action by the examiner to grant allowance is earnestly solicited.

Respectfully submitted,



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